

## REMARKS

By this amendment, claims 1-20 are pending in the application, of which, claims 1 and 8 are being amended, and claims 16-20 are being added. Claim 2 is being canceled. The amendments are fully supported by the originally filed Specification and original claims and add no new matter. For example, added claim 16 is at least supported by original claims 1 and 2, and paragraph 32 of the Specification. Entry of the amendments and reconsideration of the present case is respectfully requested.

The Examiner rejected claims 1-15 under 35 USC 102(e) as anticipated by Somekh (US patent 6,394,109).

For a Section 102 rejection, a single reference has to disclose each and every element of the claim. However, Somekh does not disclose each and every element of claim 1 or 8, and consequently, does not anticipate these claims or the claims dependent therefrom.

As amended, claim 1 recites a method for cleaning an electron beam treatment apparatus that includes generating an electron beam that energizes a cleaning gas in a chamber of the electron beam treatment apparatus, monitoring an electron beam current, adjusting a pressure of the cleaning gas to maintain the electron beam current at a substantially constant value, and stopping when the cleaning gas pressure becomes substantially constant for a predetermined length of time.

Somekh does not teach claim 1, inter alia, which states "adjusting a pressure of the cleaning gas to maintain the electron beam current at a substantially constant value, and stopping when the cleaning gas pressure becomes substantially constant for a predetermined length of time."

The Examiner suggests that Somekh discloses instant claim 2, "wherein the predetermined condition is that the cleaning gas pressure becomes substantially constant for predetermined length of time", at column 10 lines 49-65 and FIG. 4.

However, at column 10 lines 49-65, Somekh discloses introducing oxidizer into the imaging chamber of the lithography system at flow rates and periods of time that maintain a minimum and maximum required pressure levels in the imaging chamber. When a gas is first introduced into a vacuum chamber maintained at low pressures, the pressure will fluctuate due to the introduction of the gas, depending on for example, the original pressure in the chamber, the size of the chamber, and the chamber pumping efficiency. The flow rates and periods of time required to maintain minimum and maximum pressure levels as mentioned by Somekh, are those process conditions needed to stabilize such an initial fluctuation in chamber pressure to reach a desired minimum or maximum pressure level. However, a process step of setting flow rate and time conditions to maintain minimum or maximum pressure levels, is not the same as an endpoint process step of stopping a cleaning process when the cleaning gas pressure becomes substantially constant for a predetermined length of time, as claimed.

Also, stopping a process after predetermined pair of time, as disclosed by Somekh, is not the same as stopping a cleaning process only when the gas pressure becomes substantially constant, as claimed. There is no teaching in Somekh that it is desirable to stop the cleaning process when a substantially constant gas pressure is reached, or the benefits of this stopping step.

Moreover, in FIG. 4a, Somekh provides a flowchart that illustrates the steps of cleaning carbon deposits from an imaging chamber of a lithography system, which recites introducing oxygen into the imaging chamber, exposing chamber surfaces to oxygen, oxidizing carbon deposits to create oxidized carbon gas and evacuating the oxidized carbon gas from the chamber. However, FIG. 4 does not mention the step of stopping the cleaning process when the cleaning gas pressure becomes substantially

constant for a period of time as presently claimed. Thus, Somekh does not teach each and every element of claim 1.

Similarly, Somekh does not teach claim 8, which also recites generating an electron beam that energizes a cleaning gas in an electron beam chamber, and stopping the cleaning process after the cleaning gas pressure becomes substantially constant for a predetermined length of time. Somekh does not disclose that the cleaning process can be stopped when the gas pressure becomes substantially constant, or the benefits of stopping the cleaning process when a constant pressure is reached. Thus, Somekh does not anticipate claim 8.

The Examiner further rejected claims 1-15 under 35 USC 102(b) as anticipated by Ohtoshi et al. (U.S. patent 5,539,211)

Ohtoshi et al. does not disclose each and every element of claim 1, because Ohtoshi et al. does not disclose, "adjusting a pressure of the cleaning gas to maintain the electron beam current at a substantially constant value, and stopping when the cleaning gas pressure becomes substantially constant for a predetermined length of time."

The Examiner states that Ohtoshi et al. discloses "wherein the predetermined condition is that the cleaning gas pressure becomes substantially constant for predetermined length of time" at col. 11 lines 50 to col. 12, line 9.

However, at col. 11 lines 50 to col. 12, line 9, Ohtoshi et al. discusses FIG. 2 which shows a schematic of an electron beam exposure apparatus which has a cleaning function. This section further discloses that "[f]urther, while maintaining a large part of the inside of the column 1 being kept depressurized at a pressure of  $10^{-7}$  Torr, plasma (active species) of  $10^{-2}$  to several 10 Torr can be made flow, so that a time for recovering the depressurized pressure after cleaning can be greatly shortened." This section of Ohtoshi et al. discloses that "a plasma" of active species of  $10^{-2}$  to several 10

Torr is flowed into the column while the column is maintained at a low pressure. It also discloses that that a time for recovering the depressurized pressure after cleaning can be greatly shortened by setting a suitable pressure régime in the column.

However, a process step of setting a pressure régime of  $10^{-2}$  to several 10 Torr, that allows rapid recovery of a low pressure environment ( $10^{-7}$  Torr) in a column, is not the same as a process step of stopping a cleaning process when the cleaning gas pressure becomes substantially constant for a predetermined length of time, as claimed. Thus, Ohtoshi et al. does not teach every element of claim 1, and consequently, Ohtoshi et al. does not anticipate claim 1 or the claims dependent therefrom.

Similarly, Ohtoshi et al. does not teach claim 8, which also recites generating an electron beam that energizes a cleaning gas in an electron beam treatment chamber; and stopping the cleaning process upon reaching an endpoint after the cleaning gas pressure becomes substantially constant for a predetermined length of time. Ohtoshi et al. does not disclose that the cleaning process can be stopped when the gas pressure becomes substantially constant or the benefits of being able to determine when to stop the cleaning process. Thus, Ohtoshi et al. does not anticipate claim 8 or the claims dependent therefrom.

Furthermore, neither Somekh nor Ohtoshi et al. teach added claim 16, which is to a method of cleaning a chamber of an electron beam treatment apparatus in which a cleaning gas is introduced into the chamber, and an electron beam is generated to energize the cleaning gas in the chamber. An electron beam current is set in the chamber of about 10 mA or above. The pressure of the cleaning gas is adjusted to maintain the electron beam current at a substantially constant value. An endpoint of the cleaning process is determined and introduction of the cleaning gas is stopped when the cleaning gas pressure reaches a substantially constant value.

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### CONCLUSION

The above-discussed amendments are believed to place the present application in condition for allowance. Should the Examiner have any questions regarding the above remarks, the Examiner is requested to telephone Applicant's representative at the number listed below.

Respectfully submitted,  
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Date: February 28, 2005

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